

Decimal Division

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CONCEPT

1

Decimal Division

Here you'll learn to divide decimals with and without rounding.

Have you ever volunteered at an animal shelter? Well, look at what Leah did during her time at the shelter.

On Saturday, Leah went to the animal shelter to volunteer. She was in charge of feeding a bunch dogs. She was given 26.5 pounds of dog food and a .5 pound scoop to use to fill each dog bowl.

Given this amount of food and the size of the scoop, how many dog bowls could she fill?

To figure this out, you will need to know how to divide decimals. This Concept will teach you what you need to know.

Guidance

Division is useful any time that you want to split up an object or a group of objects. We divide all the time. In the real world division is very important. While you have been dividing whole numbers since elementary school, now it is time for you to learn how to divide decimals.

Dividing decimals is like dividing whole numbers. Dividing a *divisor* into a *dividend* gives a *quotient*.

$$\begin{array}{r} \text{quotient} \\ \text{divisor} \overline{) \text{dividend}} \end{array}$$

Division of decimals also has special rules for how to deal with the decimal point.

Our place-value system is based on 10. Anytime we multiply by 10, we can move the decimal point to the right the number of places per multiple of 10.

$$4.55 \times 10 = 45.5$$

Notice that we multiplied by 10 so we moved the decimal point one place to the right.

$$4.55 \times 100 = 455.$$

Notice that here we multiplied by 100, so we moved the decimal point two places to the right because 10×10 is 100. Two tens = two decimal places.

The first step to dividing decimals is to move the divisor's decimal point all the way to the right.

When we move the decimal point in the divisor to the right until it is a whole number, we also move a decimal point the *same number* of places in the dividend.

$$2.3 \overline{) 4.6}$$

2.3 is our divisor and 4.6 is the dividend. **We need to make the divisor into a whole number. To do this, we only have to move the decimal point one place to the right. That is the same as multiplying by 10.**

$$2.3 \times 10 = 23$$

If we do this to the divisor, we have to do it to the dividend too. We multiply the dividend by 10 to move the decimal one place to the right.

$$4.6 \times 10 = 46$$

Now we can divide.

$$\begin{array}{r} 2 \\ 23 \overline{) 46} \end{array}$$

Our answer is 2.

What if there aren't enough places in the dividend to move the decimal point?

If there aren't enough places in the dividend, then we can add zeros.

$$2.25 \overline{)9}$$

First, we need to make the divisor into a whole number. There are two places after the decimal point, so we need to multiply by 100.

$$2.25 \times 100 = 225$$

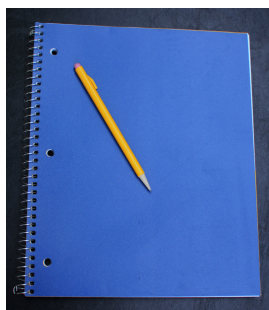
We also have to do this with the dividend. To move the decimal point two places after the nine, we have to add two zero.

$$9 \times 100 = 900$$

Now we can divide.

$$\begin{array}{r} 4 \\ 225 \overline{)900} \end{array}$$

Our answer is 4.



Take a few notes on how to move the decimal point in the divisor and dividend and then continue the Concept.

You have already seen how rounding can help us when estimating in addition, subtraction and multiplication problems. Rounding can also be useful when dividing. Sometimes, you will need to round before dividing and sometimes, you will need to round after dividing.



Pay attention and be sure to round to the designated place only.

Round each number to the nearest tenth, then divide, $67.521 \div 2.243$

This problem asks us to round each number to the tenth place before dividing.

The rounding steps: underline the number we're rounding *to* and bold or circle the number directly to the right of it.

We're rounding to the tenth place, so we'll round to the place directly to the right of the decimal place.

The bolded number, the hundredths place, is the one to look at when deciding to round up or down.

$$67.\underline{5}21 \rightarrow \text{rounded to the tenth place} \rightarrow 67.5$$

$$2.\underline{2}43 \rightarrow \text{rounded to the tenth place} \rightarrow 2.2$$

$2.2 \overline{)67.5}$ Place our rounded numbers in the long division format.

$22 \overline{)675.0}$ Multiply both numbers by 10 (making the divisor a whole number).

To adjust the dividend, move the decimal to the right of 67.5 and add a zero.

Next, we divide just as we do whole numbers. Notice, that we move the decimal point from the dividend right up into the quotient. You can draw an arrow to show how it moves from the dividend to the quotient.

$$\begin{array}{r}
 30.68181 \\
 22 \overline{)675.00000} \\
 \underline{- 66} \\
 150 \\
 \underline{- 132} \\
 180 \\
 \underline{- 176} \\
 40 \\
 \underline{- 22} \\
 180 \\
 \underline{- 176} \\
 40 \\
 \underline{- 22} \\
 18
 \end{array}$$



Yes, there is. You can see how we added zeros to help us with the dividing well there is also a pattern that is repeating at the end of this quotient. Because of this, we can conclude that we could keep adding zeros and the pattern would continue to repeat indefinitely.

What we have here is called a *repeating decimal*, because the 8181 pattern will repeat over and over. The more zeros we add to the dividend, the longer the quotient will be. **In this case, you can either round the quotient to 30.682 or you can notate the repeating decimal by putting a line over the repeating part.**

$30.6\overline{81}$

This line means that the digits under the line will repeat. For this problem, let's use a rounded answer.

Our answer is 30.682.

Now try a few on your own. Divide each to find a quotient.

Example A

$$3.96 \div 1.2$$

Solution: 3.3

Example B

$$24.288 \div 9.6$$

Solution: 2.53

Example C

Round to the nearest tenth, then divide, $4.721 \div 2.465$

Solution: $4.7 \div 2.5 = 1.88$

Here is the original problem once again.

On Saturday, Leah went to the animal shelter to volunteer. She was in charge of feeding a bunch dogs. She was given 26.5 pounds of dog food and a .5 pound scoop to use to fill each dog bowl.

Given this amount of food and the size of the scoop, how many dog bowls could she fill?

To figure this out, we can begin by writing a division problem.

We divide the number of pounds of dog food by the scoop.

$$26.5 \div .5$$

Now we divide.

53

Leah can fill 53 dog bowls before she runs out of food.

Vocabulary

Here are the vocabulary words in this Concept.

Divisor the number outside the division box. This is the number that is doing the dividing.

Dividend the number being divided. It is the number inside the division box.

Quotient the answer in a division problem.

Estimation using rounding or dividing leading digits to find an approximate answer.

Guided Practice

Here is a real world example for you to solve. It uses the formula for area that you learned in an earlier Concept.

The Landry's living room has an area of 97.92 m^2 and a length of 13.6 meters. What is the width of the living room?

Answer

Remember the formula for finding the area of a rectangle?

$$A = lw.$$

In this problem, we are given the area and the length. We need to substitute those values into the formula and solve for the width.

$$\begin{aligned} A &= lw \\ 91.92 &= 13.6w \\ \frac{91.92}{13.6} &= \frac{13.6}{13.6}w \rightarrow \text{inverse operations: divide both sides by } 13.6 \\ w &= \frac{91.92}{13.6} \end{aligned}$$

Multiply both the divisor and dividend by 10 to make the divisor a whole number; then divide.

$$\begin{array}{r} 7.2 \\ 136 \overline{)979.2} \\ \underline{-952} \\ 272 \\ \underline{-272} \\ 0 \end{array}$$

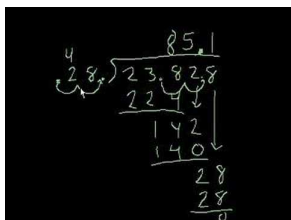
$$w = 7.2$$

Don't forget to put the units of measurement in your answer!

The answer is width = 7.2 meters

Video Review

Here are videos for review.



MEDIA

Click image to the left for more content.

- This is a [KhanAcademyvideo](#) on dividing decimals.

Practice

Directions: Find the quotient.

1. $5.4 \div 4.5$
2. $8.71 \div 6.7$
3. $3.375 \div 2.25$
4. $11.2 \div 5.6$

5. $19.11 \div 1.3$

6. $28.992 \div 18.12$

7. $113.52 \div 12.9$

8. $31.93 \div 3.1$

9. $46.125 \div 6.15$

10. $84.28 \div 17.2$

Directions: Find the quotient after rounding each to the nearest hundredth.

11. $113.409 \div 25.2157$

12. $81.862 \div 6.453$

13. $377.151 \div 11.54269$

14. $9.177 \div 4.5712$

15. $7.56 \div 2.1$